**ISL Assignment -1**

1. What is linear regression and why is it used for data analysis and predictive analysis? (Please explain briefly in your own words)
2. a) Calculate the slope (β₁) and simple linear regression equation for below sample training dataset. (intercept (β₀) = 3)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Y (response) | 13 | 15 | 17 | 19 | 21 |
| X (predictor) | 5 | 6 | 7 | 8 | 9 |

b) Calculate RSE(Residual Standard Error) and R^2(Coefficient of Determination) on below testing dataset

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Y (response) | 24 | 27 | 30 | 33 | 36 |
| X (predictor) | 10 | 11 | 12 | 13 | 14 |

1. a) Calculate multiple linear Equation and show value of estimated coefficients.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **X1** | **X2** | **X3** | **Y** |
| 1 | 25 | 15 | 20 | 350 |
| 2 | 30 | 20 | 15 | 420 |
| 3 | 20 | 18 | 25 | 310 |
| 4 | 35 | 22 | 22 | 460 |
| 5 | 28 | 17 | 18 | 380 |

b) Calculate the adjusted R-squared (R²) value for this regression model.

c) Predict Y for the following values X1 = 32, X2 = 19 , X3 = 21

1. Perform simple linear regression on your favorite dataset (Example: Boston dataset in ISLR2 library)
2. Import the dataset.
3. Test functions like head(), tail(), nrow(), ncol(), dim() etc.,
4. Create simple linear regression model using sklearn or statsmodels packages
5. Find RSE (Residual Standard Error)
6. Create a plot using the matplotlib package to display the model
7. Perform Multiple linear regression on a different dataset and answer above questions.